

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-343876

(43)Date of publication of application : 20.12.1994

(51)Int.Cl.

B01J 35/04

B01D 53/36

F01N 3/28

F01N 3/28

F01N 7/18

(21)Application number : 05-137982

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(22)Date of filing : 08.06.1993

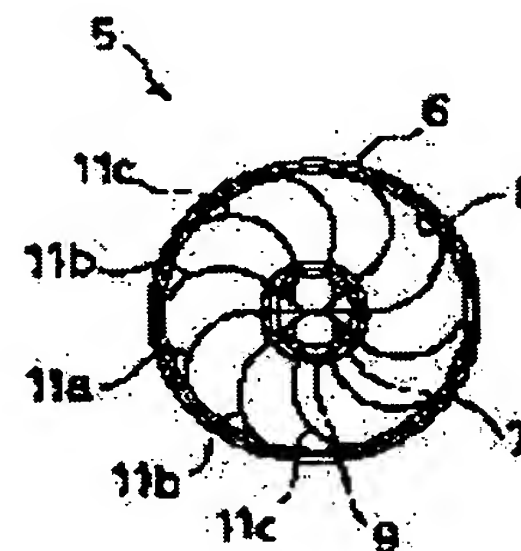
(72)Inventor : YAMAUCHI YOSHIKUNI

(54) DEVICE FOR PURIFYING EXHAUST GAS OF INTERNAL COMBUSTION ENGINE

(57)Abstract:

PURPOSE: To provide a device for purifying exhaust gas of an internal combustion engine where brazing is not required and a pipe diameter is made small and the distribution of flow velocities is made uniform.

CONSTITUTION: In a device for purifying exhaust gas of an internal combustion engine 5 in which metal plates 11a-11c are housed and held in a holding cylindrical body 6 and a catalyst is carried on the surface of the metal plates 11a-11c to form, the metal plates 11a-11c are arranged so as to radially extend from the central part of the holding cylindrical body 6 and the outside end part of the metal plates 11a-11c are abutted on the inner surface of the holding cylindrical body 6 with elastic force.



## LEGAL STATUS

[Date of request for examination] 31.03.2000

[Date of sending the examiner's decision of rejection] 12.11.2002

[Kind of final disposal of application other than

the examiner's decision of rejection or  
application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's  
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CLAIMS

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[Claim(s)]

[Claim 1] The exhaust gas purge of the internal combustion engine which does hold maintenance of the metal plate into a maintenance barrel, and is characterized by having arranged the above-mentioned metal plate in the exhaust gas purge of the internal combustion engine which makes the front face of this metal plate come to support a catalyst so that it may extend in a radial from the core of the above-mentioned maintenance barrel, and making the outside edge of this metal plate contact the inside of the above-mentioned maintenance barrel with elastic force.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a detail about the exhaust gas purge of the internal combustion engine which supported the catalyst at an improvement of the arrangement structure of the above-mentioned metal plate on the front face of the metal plate by which hold maintenance was carried out into the maintenance barrel.

[0002]

[Description of the Prior Art] Generally, the exhaust gas purge for purifying exhaust gas is prepared in an internal combustion engine's exhauster. For example, in the case of the two-cycle engine of small displacement, a metal plate is arranged in a cylinder-like maintenance barrel, and the thing of the structure which supported the catalyst with the front face of this metal plate is adopted.

[0003] In the above-mentioned exhaust gas purge, as structure which arranges a metal plate in a maintenance barrel, as shown in drawing 19 and 20, the compound plate 33 which fixes the metal corrugated plate 32 on the front face of the metal plate 31, and becomes it is made into a curled form, and there is a thing which it comes to insert into the maintenance tubing 34.

[0004]

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional structure, since a metal plate 31, 32 comrades and the compound plate 33, and the maintenance tubing 34 are fixed and low attachment is required, processes, such as vacuum heating, are required and there is a problem used as cost quantity. Moreover, since a manufacture error and thermal expansion are unabsorbable, stress concentration occurs, and there are also breakage of equipment and a problem of catalyst performance degradation.

[0005] Moreover, since it is the structure of forming the compound plate which comes to fix a corrugated plate in a monotonous front face at a curled form, there is a problem used as a major diameter on the need of avoiding a numerical aperture becoming small and the pressure loss of exhaust gas becoming excessive.

[0006] Conventionally [ above-mentioned ], with structure, from the core of tubing, since a viscous drag becomes high, as for exhaust gas, many directions of the periphery section flow a tubing core, and unevenness arises in the velocity distribution in tubing further again. Therefore, while the catalyst for a tubing core carries out partial degradation and endurance becomes low, there is a problem on which purification effectiveness gets worse.

[0007] This invention was made in view of the above-mentioned conventional trouble, and can make low attachment unnecessary, and can miniaturize a tube diameter, and aims at offering the exhaust gas purge of the internal combustion engine which can equalize a velocity distribution further.

[0008]

[Means for Solving the Problem] This invention carries out hold maintenance of the metal plate into a maintenance barrel, and in the exhaust gas purge of the internal combustion engine which makes this metal plate front face come to support a catalyst, it arranges the above-mentioned metal plate so that it

may extend in a radial from the core of the above-mentioned maintenance barrel, and it is characterized by making the outside edge of this metal plate contact the inside of the above-mentioned maintenance barrel with elastic force.

[0009]

[Function] Since the outside edge of this metal plate was made to contact the inside of a maintenance barrel with elastic force according to the exhaust gas purge concerning this invention while arranging a metal plate so that it may extend in a radial from the core of a maintenance barrel, low attachment can be made unnecessary. Moreover, since it has the self-hold force by the above-mentioned elastic force, a manufacture error and the amount of thermal expansion can be absorbed, and deformation by stress concentration and generating of a crack can be prevented.

[0010] Moreover, since the numerical aperture is large compared with the case where an above-mentioned compound plate is used, minor-diameter-izing of a maintenance barrel is possible.

[0011] A core can be dense further again on the structure which arranges a metal plate to a radial, and the periphery section can serve as a non-dense, therefore a velocity distribution can be equalized in a core and the periphery section, and endurance and purification effectiveness can be raised.

[0012]

[Example] Hereafter, the example of this invention is explained based on an accompanying drawing. a part of muffler to which drawing 1 thru/or drawing 4 are drawings for explaining the exhaust gas purge of the internal combustion engine by the 1st example of this invention, and, as for drawing 1, this example equipment was applied -- a cross-section side elevation, drawing 2, and drawing 3 -- some above-mentioned purges -- a cross-section side elevation, a front view, and drawing 4 are drawings like an erector.

[0013] In drawing 1, 1 shows the exhauster for small displacement two-cycle engines. This exhauster 1 consists of an exhaust pipe 2 connected to the engine exhaust air port, and a muffler 3 connected to this. This muffler 3 is the thing of the structure which arranged the exhaust gas purge 5 of silence pipe 3a and this example equipment in the interior while forming the whole in two or more rooms 4a-4d. Moreover, support immobilization of the platinum is carried out at partial 2a shown with the illustration broken line of the above-mentioned exhaust pipe 2 and silence pipe 3a, and 2b.

[0014] Next, based on drawing 2 and 3, the structure of the above-mentioned exhaust gas purge 5 is explained. In drawing, the whole is formed by homogeneous members, such as ferrite system stainless steel, as for a purge 5, the inner pipe 7 is inserted into the maintenance barrel 6, the thrust stop ring 8 is carried out in the illustration both ends of this maintenance barrel 6, and welding immobilization of the stop ring 9 is respectively carried out at the left end of [ illustration ] the pipe 7 in the above. Moreover, many slits 10 are formed in the pipe 7 in the above at shaft orientations, and the metal plates 11a-11c which support a catalyst are attached by the approach of mentioning later to this slit 10. These metal plates 11a-11c curving from the core of the above-mentioned maintenance barrel 6, as shown in drawing 3, they have been arranged so that it may extend in a radial, and that outside edge is in contact with the inside of the above-mentioned maintenance barrel 6 with elastic force.

[0015] Next, the operation effectiveness of this example equipment is explained. The assembly procedure of the exhaust gas purge 5 of this example is explained. Based on drawing 4, how to attach metal plates 11a-11c in the pipe 7 in the above is explained first. First, it inserts in shaft orientations in the condition of having made it curving for a while so that the slits 10b and 10b which are in the angular position same at the same side to metal plate which inserted metal plate 11b previously next as it inserted in shaft orientations so that slitsa [ 10 ] and 10a which counter metal plate 11a mutually in inner pipe 7 as shown in drawing 4 (a) may be built, and shown in this drawing (b) 11a may be built. As furthermore shown in this drawing (c), metal plate 11c is inserted from Slits 10c and 10c like the above, and the above-mentioned stop ring 9 is attached in the inner pipe 7. The assembly of the metal plates 11a-11c and the inner pipe 7 which this shows to drawing 4 (c) is formed. Next, it inserts into the maintenance barrel 6, twisting this assembly, and, finally the thrust stop 8 is fixed. Then, it extends in a radial, each above-mentioned metal plates 11a-11c curving, as shown in drawing 3, and the inside of the maintenance barrel 6 is contacted with elastic force.



[0016] According to the exhauster 1 equipped with this example equipment 5, exhaust gas passes along the inside of silence pipe 3a from an exhaust pipe 2, as shown in drawing 1, and it is discharged from a tail pipe through each part stores 4a-4d. Exhaust gas is purified in this flow process by the above-mentioned platinum and the catalysis by the catalyst.

[0017] Thus, since the outside both ends of these metal plates 11a-11c were made to contact the inside of the maintenance barrel 6 with elastic force in this example while arranging metal plates 11a-11c so that it may extend in a radial from the core of the maintenance barrel 6, low attachment can be made unnecessary and cost can be reduced. Moreover, since a manufacture error and thermal expansion are absorbable, the breakage and catalyst performance degradation of equipment by stress concentration are avoidable. Furthermore, since a numerical aperture becomes large, -izing of the tubing can be carried out [ minor diameter ]. Since the velocity distribution of the exhaust gas in tubing can be equalized, partial degradation of a catalyst and the fall of endurance can be avoided and purification effectiveness can be improved further again.

[0018] Here, as shown in drawing 5 and drawing 6, various kinds of modifications are employable as the above-mentioned metal plate. Drawing 5 shows the 2nd example and uses what performed wave processing to the above-mentioned metal plates 11a-11c in this example. In this example, since the surface area of a metal plate is further expandable while the same effectiveness as the 1st example of the above is acquired, the amount of catalysts to support can be increased. Moreover, since the rigidity of a metal plate can be reduced, assembly nature can be improved.

[0019] Drawing 6 shows the 3rd example, and in this example, the flection 12 is formed in metal plates 11a-11c, and this flection 12 consists of the exhaust air upstream of an illustration left so that it may become small gradually toward the downstream of the method of the right. In addition, the configuration before this Fig. is inserted in the above-mentioned maintenance barrel 6 is shown, and illustration of the inner pipe 7 is omitted.

[0020] In this example, since a front projected area of a metal plate is expandable with a flection 12 while the same effectiveness as the 1st example of the above is acquired, exhaust gas tends to contact a catalyst, and has become it and purification effectiveness can be improved so much.

[0021] Next, the 4th example of this invention is explained based on drawing 7 - drawing 10. In addition, the same sign as the account example of drawing Nakagami shows the same or a considerable member. Moreover, for a front view and drawing 9, the IX-IX line sectional view of drawing 7 and drawing 10 are [ drawing 7 / the cross-section side elevation of this example purge, and drawing 8 ] drawing 7. X-X It is a line sectional view. And it sets to drawing 7 and is an illustration right-hand side part from an IX-IX line. The (I) section and the illustration left-hand side part are made into the (II) section.

[0022] It describes above in drawing. (I) As the metal plate 13 on the staff is shown in drawing 9, the above-mentioned (II) metal plate 14 on the staff is clockwise arranged again so that it may curve counterclockwise, as shown in drawing 10. The two above-mentioned metal plates 13 and 14 are carrying out opposite contact by part for an IX-IX line part. Consequently, as shown in drawing 8, if metal plates 13 and 14 are seen to shaft orientations, they are making petaloid.

[0023] In this example, since the above-mentioned metal plates 13 and 14 with which the curve directions differ were formed in the maintenance barrel 6 while the same effectiveness as the 1st example of the above was acquired, the touch area to the catalyst of exhaust gas can raise increase and purification effectiveness more.

[0024] Next, the 5th example of this invention is explained based on drawing 11 - drawing 14. In addition, the same sign as the account example of drawing Nakagami shows the same or a considerable member. drawing 11 and 12 -- some this example purges -- a cross-section side elevation, a front view, and drawing 13 -- the XIII-XIII line sectional view of drawing 11, and drawing 14 -- drawing 11 XIV-XIV It is a line sectional view. [ moreover, ] And P2-P three-room part of drawing 11 Between the (I) section and PP1-2 and a P3-P four-room part are made into the (II) section.

[0025] It sets to drawing and is the above-mentioned maintenance barrel 6. As shown in drawing 13, while a metal plate 15 makes it curve clockwise and is arranged in the (I) part, insertion arrangement of

the pipe 16 is carried out between these metal plates 15. Moreover, in the (II) part of the maintenance barrel 6, as shown in drawing 14, a metal plate 17 makes it curve counterclockwise, and is arranged. And 17 are carrying out opposite contact by part for the two above-mentioned metal plates 15, P2, and P3 line part.

[0026] In this example, since the metal plates 15 and 17 with which the curve directions differ mutually were formed, while the same effectiveness as the 4th example of the above is acquired, the elastic force to which it can improve more and a metal plate 15 has purification effectiveness in the maintenance barrel 6 since insertion arrangement of the pipe 16 was carried out and the touch area to the catalyst of exhaust gas increases more can be held effectively. Furthermore, it becomes possible to hold spacing of metal plate 15 these to arbitration by changing the path of the above-mentioned pipe 16.

[0027] Moreover, drawing 15 fixes a metal plate by the 2nd assembly approach, and shows the 6th example inserted in the maintenance barrel 6. The approach is explained below. First, as shown in this drawing (a), these two or more metal plates 24 of each other are put for the both ends of a metal plate 24 on an opposite direction with this dimension \*\*\*\*\*. And as shown in this drawing (b), the center of the above-mentioned metal plate 24 is pressed in the press pipe 25, and the both ends of this press pipe 25 are fixed with a stop ring 26. In addition, the above-mentioned press pipe 25 is set up for a long time in [ metal plate / 24 ] this case only for stop ring 26 minutes. And insertion immobilization is carried out at the maintenance barrel 6, incurvating the above-mentioned metal plate 24, as shown in this drawing (c).

[0028] By the assembling approach, since the press pipe 25 was used, the slit of the pipe 7 in the above can be made unnecessary, and a man day can be reduced. moreover, as mentioned above, spacing in the maintenance barrel 6 neighborhood of a metal plate 24 can be maintained for the both ends of a metal plate 24 at equal intervals by that of this dimension chip box music wooden clogs. In addition, the assembling approach is further employable also as the above 1st - the 5th example also to the metal plate which does not perform the above-mentioned bending processing.

[0029] Here, the shape of surface type of the metal plate used for the purge of this invention is described based on drawing 16 - drawing 18. in addition, drawing 17 (b) -- (\*\*) of this drawing (a) -- it is a direction perspective view and drawing 18 (b) is the (b) direction perspective view of this drawing (a). The example which drawing 17 and 18 cut holes 28 and 29, and established the example in which drawing 16 formed the round hole 27 by punch in the metal plate front face by the lifting is shown respectively. Since exhaust gas becomes easy to hit to a catalyst and the flow of the gas of the direction of an axial right angle of this barrel 6 both occurs within the maintenance barrel 6, each above-mentioned example can improve purification effectiveness. Furthermore, since the flow of gas becomes smooth with the configuration of a hole 28 in the example of above-mentioned drawing 17, and since the touch area to the catalyst of exhaust gas increases in the example of drawing 18, the capacity of equipment can be improved more.

[0030]  
[Effect of the Invention] Since according to the exhaust gas purge of the internal combustion engine applied to this invention as mentioned above the metal plate is arranged so that it may extend in a radial from the core of a maintenance barrel, and the outside edge of this metal plate was made to contact the inside of the above-mentioned maintenance barrel with elastic force There is effectiveness which low attachment can be made unnecessary, and it is effective in the ability to prevent the crack by stress concentration etc., and can miniaturize the path of a maintenance cylinder, and there is effectiveness which equalizes a velocity distribution further and can improve endurance and purification effectiveness.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] some exhausters with which the purge of the internal combustion engine by the 1st example of this invention was applied -- it is a cross-section side elevation.

[Drawing 2] some purges by the 1st example of the above -- it is a cross-section side elevation.

[Drawing 3] It is the front view of the purge by the 1st example of the above.

[Drawing 4] It is a mimetic diagram for explaining how to attach a metal plate in the inner pipe of the purge by the 1st example of the above.

[Drawing 5] It is the front view of the purge of the internal combustion engine by the 2nd example of this invention.

[Drawing 6] It is the perspective view of the metal plate applied to the purge of the internal combustion engine by the 3rd example of this invention.

[Drawing 7] It is the cross-section side elevation of the purge of the internal combustion engine by the 4th example of this invention.

[Drawing 8] It is the front view of the purge by the 4th example of the above.

[Drawing 9] It is the IX-IX line sectional view of drawing 7 .

[Drawing 10] Drawing 7 X-X It is a line sectional view.

[Drawing 11] It is the cross-section side elevation of the purge of the internal combustion engine by the 5th example of this invention.

[Drawing 12] It is the front view of the purge by the 5th example of the above.

[Drawing 13] It is the XIII-XIII line sectional view of drawing 11 .

[Drawing 14] Drawing 11 XIV-XIV It is a line sectional view.

[Drawing 15] It is a mimetic diagram for explaining the 2nd assembly approach.

[Drawing 16] It is the mimetic diagram showing the shape of surface type of the metal plate used for the purge of this invention.

[Drawing 17] It is the mimetic diagram showing the shape of surface type of the metal plate used for the purge of this invention.

[Drawing 18] It is the mimetic diagram showing the shape of surface type of the metal plate used for the purge of this invention.

[Drawing 19] It is the cross-section side elevation of the compound plate in the conventional purge.

[Drawing 20] It is the front view of equipment conventionally [ above-mentioned ].

### [Description of Notations]

5 Exhaust Gas Purge

6 Maintenance Barrel

17 11a-11c, 13-15, 24 Metal plate

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[Translation done.]



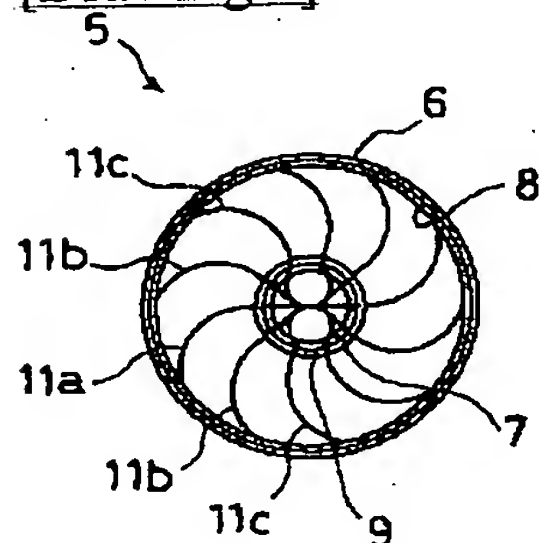
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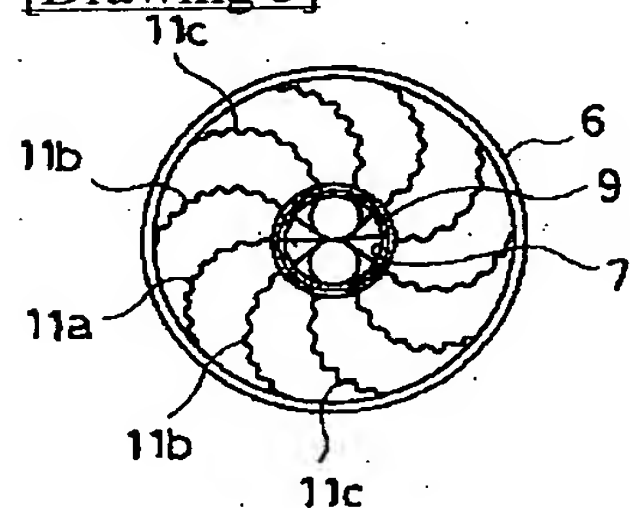
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## DRAWINGS

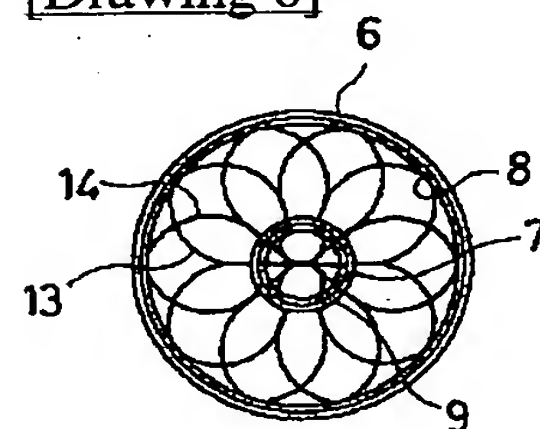
[Drawing 3]



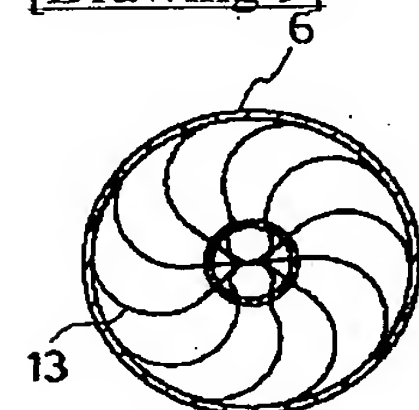
[Drawing 5]



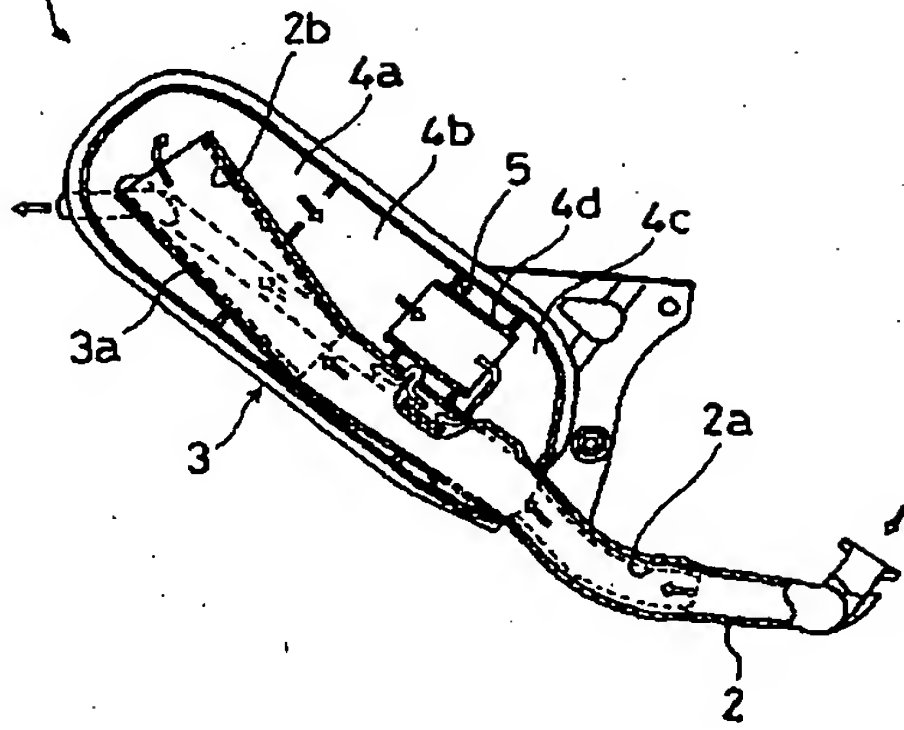
[Drawing 8]



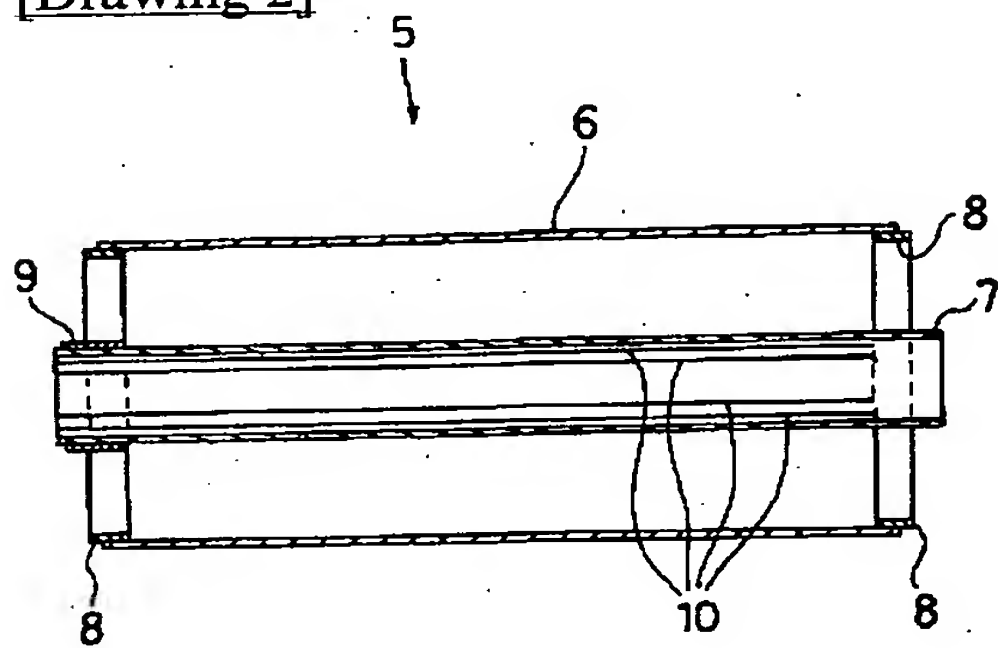
[Drawing 9]



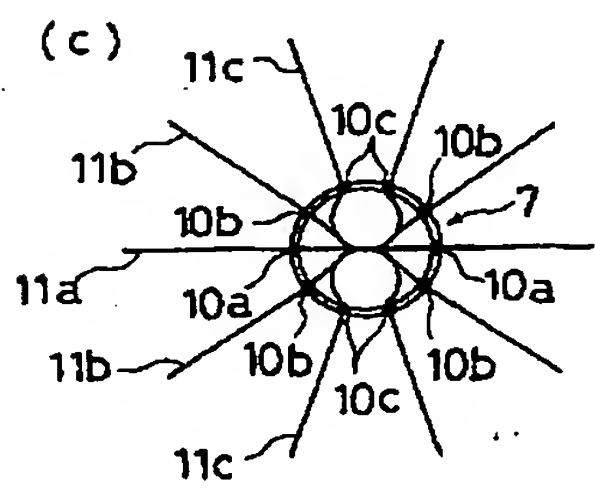
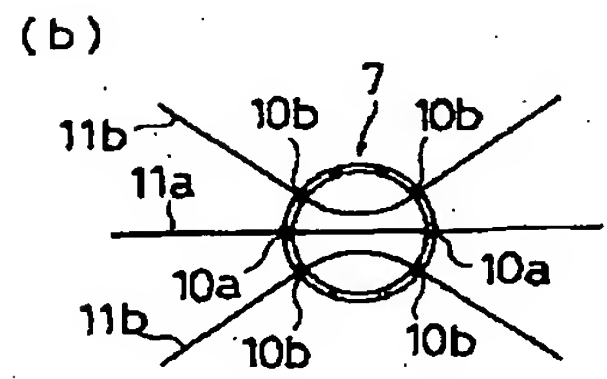
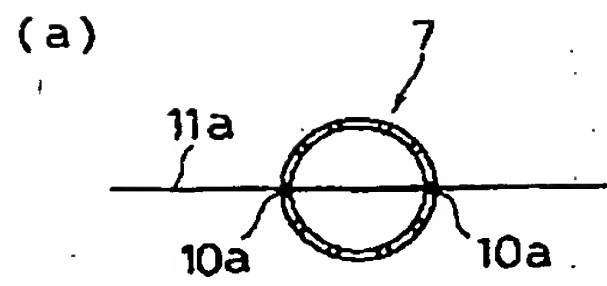
[Drawing 1]



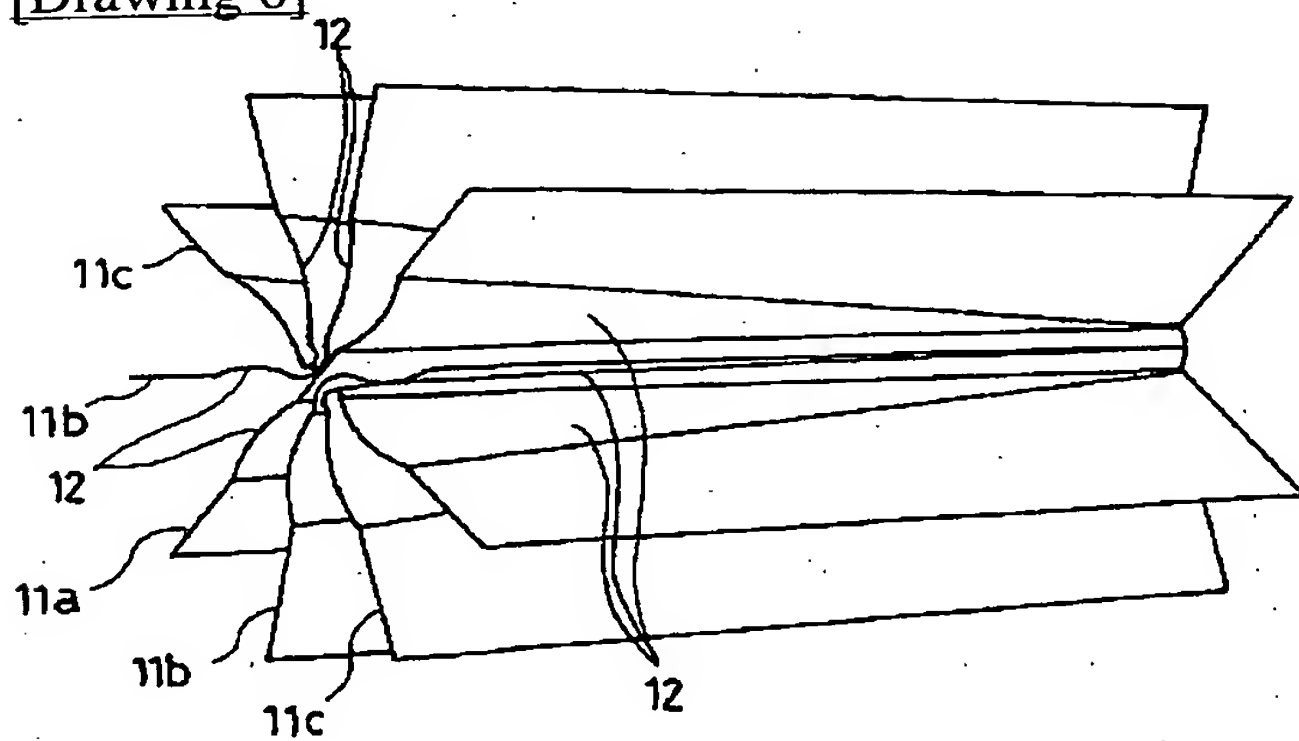
[Drawing 2]



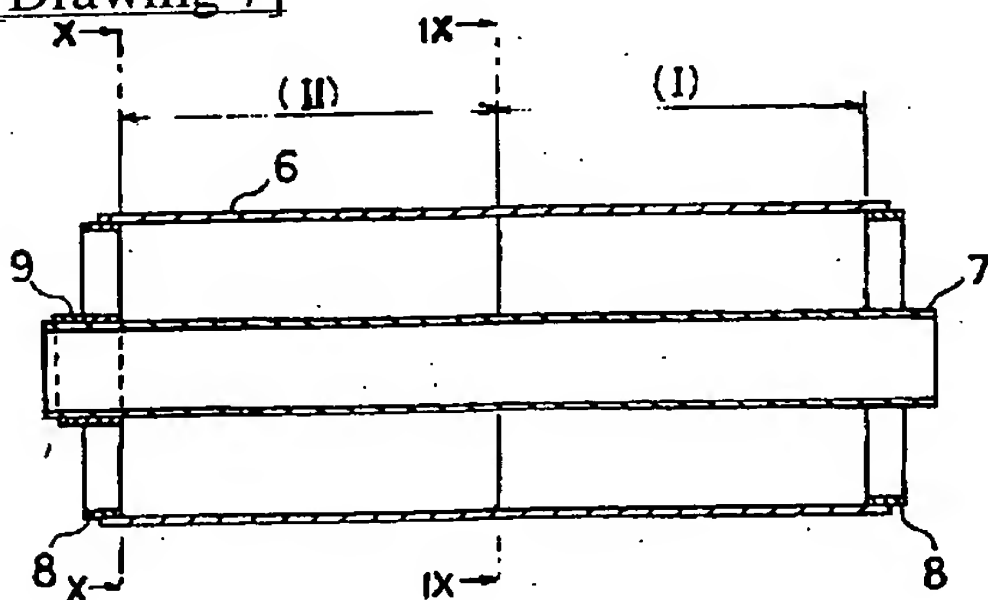
[Drawing 4]



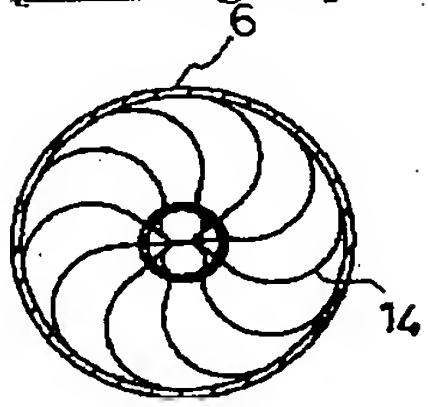
[Drawing 6]



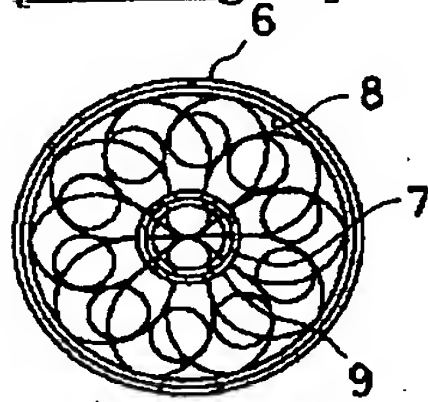
[Drawing 7]



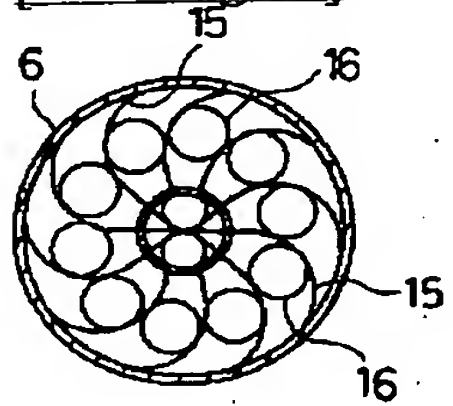
[Drawing 10]



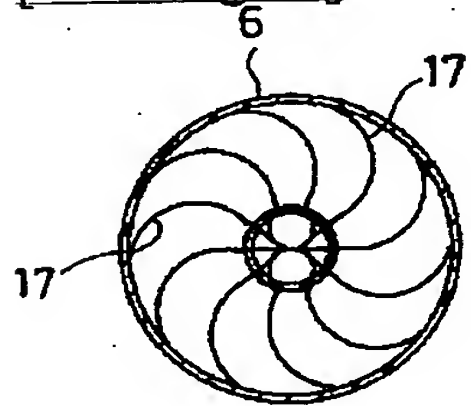
[Drawing 12]



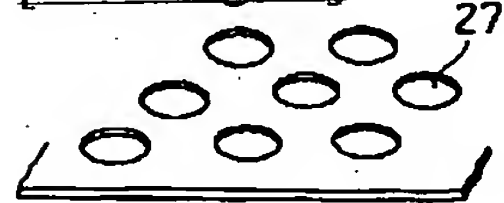
[Drawing 13]



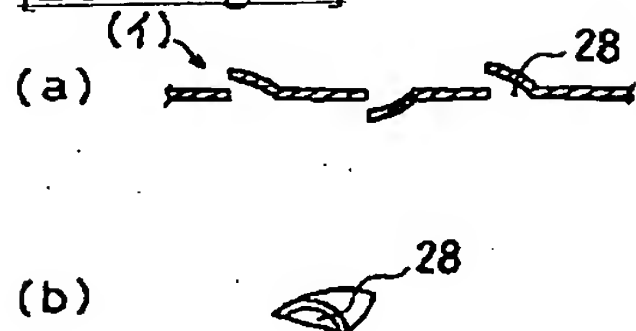
[Drawing 14]



[Drawing 16]



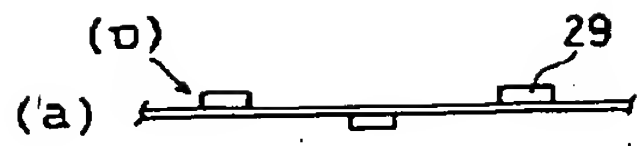
[Drawing 17]



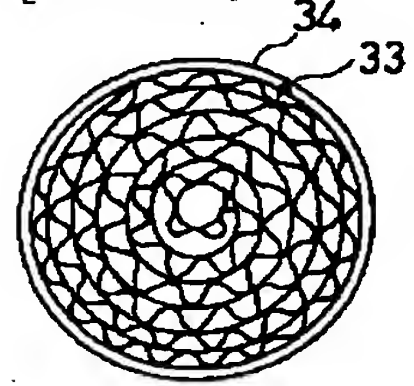
[Drawing 18]



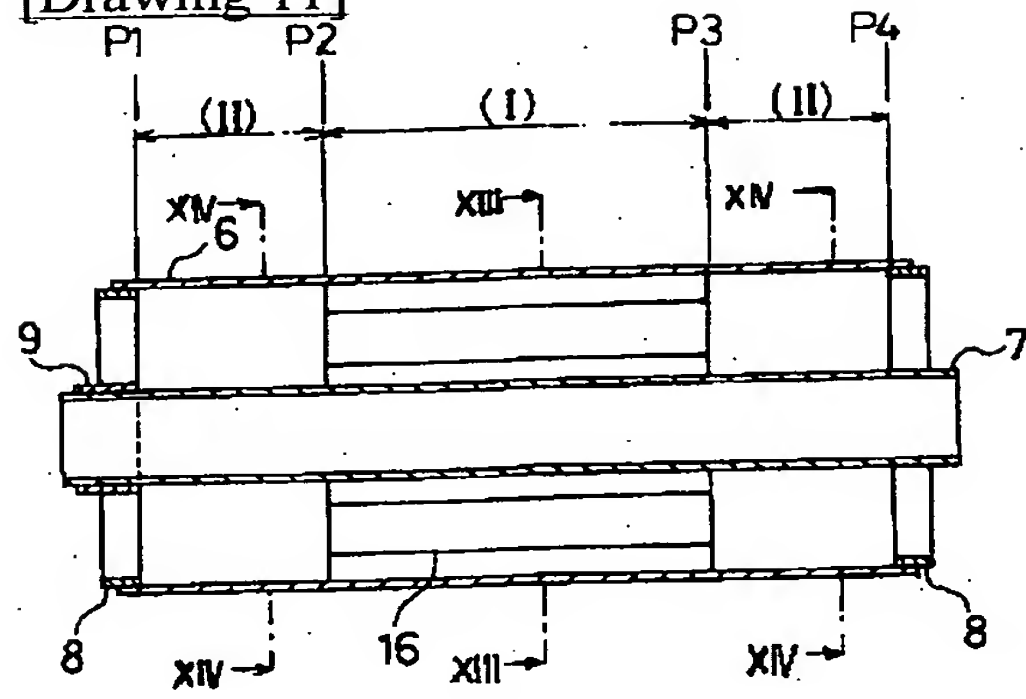




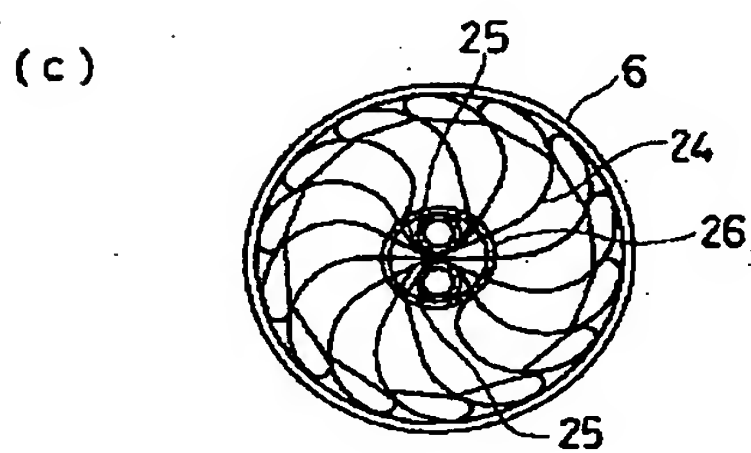
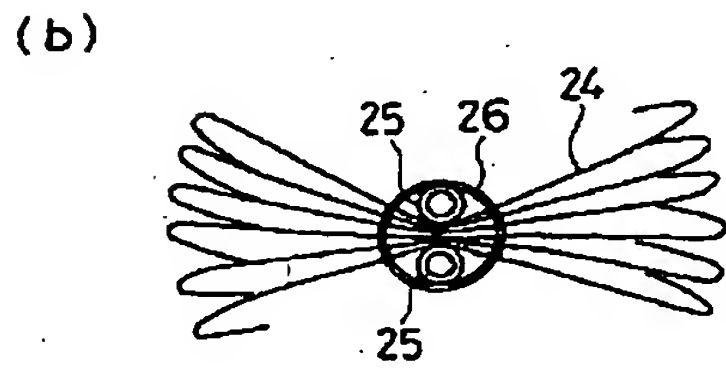
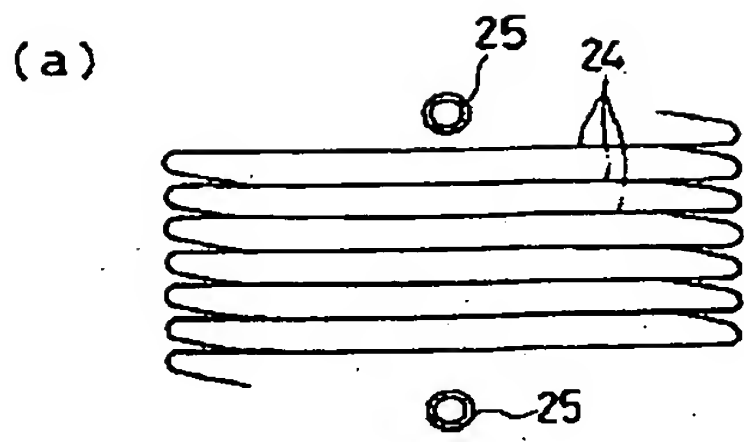
[Drawing 20]



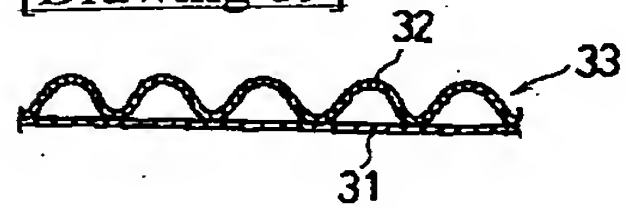
[Drawing 11]



[Drawing 15]



[Drawing 19]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11) 特許出願公開番号

特開平6-343876

(43) 公開日 平成 6 年 (1994) 12 月 20 日

(51) Int.Cl. <sup>5</sup>	識別記号	庁内整理番号	F I	技術表示箇所
B 0 1 J 35/04	Z A B Z	8017-4G		
B 0 1 D 53/36	Z A B C			
F 0 1 N 3/28	Z A B			
	3 1 1 R			
7/18				

審査請求 未請求 請求項の数 1 O L (全 6 頁)

(21) 出願番号 特願平5-137982

(22) 出願日 平成 5 年 (1993) 6 月 8 日

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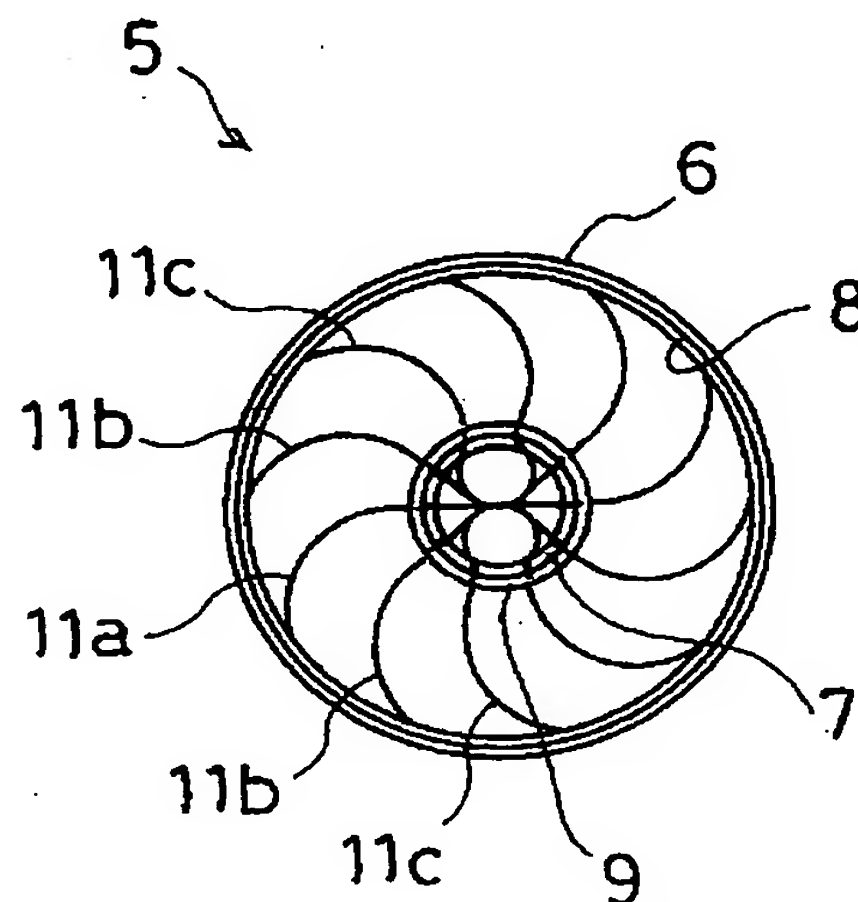
(74) 代理人 弁理士 下市 努

(54) 【発明の名称】 内燃機関の排気ガス浄化装置

(57) 【要約】

【目的】 ロー付けを不要にでき、また管径を小型化でき、さらに流速分布を均一化することができる内燃機関の排気ガス浄化装置を提供する。

【構成】 保持筒体6内に金属板11a~11cを収容保持し、該金属板11a~11cの表面に触媒を担持させてなる内燃機関の排気ガス浄化装置5において、上記金属板11a~11cを上記保持筒体6の中心部から放射状に延びるように配置し、該金属板11a~11cの外側端部を上記保持筒体6の内面に弾性力を持って当接させる。



## 【特許請求の範囲】

【請求項1】 保持筒体内に金属板を收容保持し、該金属板の表面に触媒を担持させてなる内燃機関の排気ガス浄化装置において、上記金属板を上記保持筒体の中心部から放射状に延びるように配置し、該金属板の外側端部を上記保持筒体の内面に弾性力を持って当接させたことを特徴とする内燃機関の排気ガス浄化装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、保持筒体内に收容保持された金属板の表面で触媒を担持するようにした内燃機関の排気ガス浄化装置に関し、詳細には上記金属板の配置構造の改善に関する。

## 【0002】

【従来の技術】 一般に、内燃機関の排気装置には排ガスを浄化するための排気ガス浄化装置が設けられている。例えば、小排気量の2サイクルエンジンの場合、円筒状の保持筒体内に金属板を配置し、該金属板の表面で触媒を担持した構造のものが採用されている。

【0003】 上記排気ガス浄化装置において、金属板を保持筒体内に配置する構造として、例えば図19、20に示すように、金属製平板31の表面に金属製波板32を固着してなる複合板33を渦巻き状にして保持管34内に挿入してなるものがある。

## 【0004】

【発明が解決しようとする課題】 しかし、上記従来の構造では、金属板31、32同士及び複合板33と保持管34とを固定するためにロー付けが必要であることから、真空加熱等の工程を要し、コスト高となる問題がある。また、製造誤差や熱膨張を吸収できないことから応力集中が発生し、装置の破損や触媒性能の低下の問題もある。

【0005】 また、平板の表面に波板を固着してなる複合板を渦巻き状に設ける構造であるため、開口率が小さくなり、排気ガスの圧力損失が過大になるのを回避する必要上、大径となる問題がある。

【0006】 さらにまた、上記従来構造では、管の中心部より外周部の方が粘性抵抗が高くなることから、排気ガスは管中心部を多く流れ、管内の流速分布にむらが生じる。そのため、管中心部分の触媒が部分劣化し、耐久性が低くなるとともに、浄化効率が悪化する問題がある。

【0007】 本発明は、上記従来問題点に鑑みてなされたもので、ロー付けを不要にでき、また管径を小型化でき、さらに流速分布を均一化することができる内燃機関の排気ガス浄化装置を提供することを目的としている。

## 【0008】

【課題を解決するための手段】 本発明は、保持筒体内に金属板を收容保持し、該金属板表面に触媒を担持させて

なる内燃機関の排気ガス浄化装置において、上記金属板を上記保持筒体の中心部から放射状に延びるように配置し、該金属板の外側端部を上記保持筒体の内面に弾性力を持って当接させたことを特徴としている。

## 【0009】

【作用】 本発明に係る排気ガス浄化装置によれば、金属板を保持筒体の中心部から放射状に延びるように配置するとともに、該金属板の外側端部を保持筒体の内面に弾性力を持って当接させたので、ロー付けを不要にできる。また上記弾性力による自己保持力を有していることで、製造誤差、熱膨張量を吸収でき、応力集中による変形、クラックの発生を防止できる。

【0010】 また、上述の複合板を用いる場合に比べて開口率が大いので、保持筒体の小径化が可能である。

【0011】 さらにまた、金属板を放射状に配置する構造上、中心部が密で、外周部が疎となり、そのため中心部と外周部とで流速分布を均一化することができ、耐久性や浄化効率を高めることができる。

## 【0012】

【実施例】 以下、本発明の実施例を添付図面に基づいて説明する。図1ないし図4は本発明の第1実施例による内燃機関の排気ガス浄化装置を説明するための図であり、図1は本実施例装置が適用されたマフラーの一部断面側面図、図2、図3は上記浄化装置の一部断面側面図、正面図、図4は組立工程図である。

【0013】 図1において、1は小排気量2サイクルエンジン用排気装置を示す。この排気装置1はエンジンの排気ポートに接続されたエキゾーストパイプ2と、これに接続されたマフラー3とからなる。このマフラー3は全体を複数の部屋4a～4dに画成するとともに、内部に消音パイプ3a及び本実施例装置の排気ガス浄化装置5を配設した構造のものである。また上記エキゾーストパイプ2、及び消音パイプ3aの図示破線で示す部分2a、2bには白金が担持固定されている。

【0014】 次に、図2、3に基づいて上記排気ガス浄化装置5の構造を説明する。図において、浄化装置5はその全体がフェライト系ステンレス等の同質部材で形成されており、保持筒体6内に内パイプ7が挿入され、該保持筒体6の図示両端部にはスラスト止めリング8が、また上記内パイプ7の図示左端には固定リング9が各々溶接固定されている。また、上記内パイプ7には多数のスリット10が軸方向に設けられ、該スリット10に後述する方法により、触媒を担持する金属板11a～11cが取り付けられている。この金属板11a～11cは図3に示すように、上記保持筒体6の中心部から湾曲しつつ放射状に延びるよう配置され、かつその外側端部は上記保持筒体6の内面に弾性力を持って当接している。

【0015】 次に本実施例装置の作用効果について説明する。本実施例の排気ガス浄化装置5の組立手順について説明する。まず図4に基づいて、上記内パイプ7に金



属板11a~11cを取り付ける方法について説明する。まず、図4(a)に示すように、金属板11aを内パイプ7内に互いに対向するスリット10a、10aに架け渡すように軸方向に挿入し、次に同図(b)に示すように、金属板11bを先に挿入した金属板11aに対して同じ側で同じ角度位置にあるスリット10b、10bに架け渡すように少し湾曲させた状態で軸方向に挿入する。さらに同図(c)に示すように、上記と同様にして金属板11cをスリット10c、10cから挿入し、上記固定リング9を内パイプ7に嵌着する。これにより図4(c)に示す金属板11a~11cと内パイプ7との組立体が形成される。次にこの組立体をねじりながら保持筒体6内に挿入し、最後にスラスト止め8を固着する。すると図3に示すように上記各金属板11a~11cが湾曲しつつ放射状に延び、保持筒体6の内面に弾性力を持って当接する。

【0016】本実施例装置5を備えた排気装置1によれば、排気ガスは図1に示すようにエキゾーストパイプ2から消音パイプ3a内を通り、各部屋4a~4dを経てテールパイプから排出される。この流動過程において排気ガスは、上記白金、及び触媒による触媒作用により浄化される。

【0017】このように本実施例では金属板11a~11cを保持筒体6の中心部から放射状に延びるように配置するとともに、該金属板11a~11cの外側両端部を保持筒体6の内面に弾性力を持って当接させたので、ロー付けを不要にでき、コストを低減できる。また、製造誤差や熱膨張を吸収できるため、応力集中による装置の破損や触媒性能の低下を回避できる。さらに、開口率が大きくなるため、管を小径化できる。さらにまた、管内の排気ガスの流速分布を均一化することができるため、触媒の部分劣化や耐久性の低下を回避でき、浄化効率を向上できる。

【0018】ここで、上記金属板には図5、図6に示すように各種の変形例が採用できる。図5は第2実施例を示し、この例では上記金属板11a~11cに波形加工を施したものを採用している。本実施例では、上記第1実施例と同様の効果が得られるとともに、さらに金属板の表面積を拡大できるので、担持する触媒量を増加できる。また、金属板の剛性を低下させることができるので、組立性を向上できる。

【0019】図6は第3実施例を示し、この例では、金属板11a~11cに屈曲部12を設けており、該屈曲部12は図示左方の排気上流側から右方の下流側に向かって徐々に小さくなるよう構成されている。なお、本図は、上記保持筒体6に挿入される前の形状を示しており、また内パイプ7の図示は省略している。

【0020】本実施例では、上記第1実施例と同様の効果が得られるとともに、屈曲部12により金属板の前方投影面積を拡大できるため、排気ガスが触媒に接触し易

くなっており、それだけ浄化効率を向上できる。

【0021】次に、本発明の第4実施例を図7~図10に基づいて説明する。なお、図中上記実施例と同一符号は同一又は相当部材を示す。また、図7は本実施例浄化装置の断面側面図、図8は正面図、図9は図7のIX-IX線断面図、図10は図7のX-X線断面図である。そして、図7においてIX-IX線より図示右側部分を(I)部、図示左側部分を(II)部としている。

【0022】図において、上記(I)部内の金属板13は図9に示すように時計方向に、また上記(II)部内の金属板14は図10に示すように反時計方向に湾曲するように配置されている。上記2つの金属板13、14はIX-IX線部分で対向当接している。その結果、図8に示すように、金属板13、14は軸方向に見ると花卉状をなしている。

【0023】本実施例では、上記第1実施例と同様の効果が得られるとともに、保持筒体6内に湾曲方向の異なる上記金属板13、14を設けたので、排気ガスの触媒に対する接触面積が増し、浄化効率をより高めることができる。

【0024】次に、本発明の第5実施例を図11~図14に基づいて説明する。なお、図中上記実施例と同一符号は同一又は相当部材を示す。また、図11、12は本実施例浄化装置の一部断面側面図、正面図、図13は図11のXIII-XIII線断面図、図14は図11のXIV-XIV線断面図である。そして、図11のP2-P3間部分を(I)部、P1-P2間及びP3-P4間部分を(II)部としている。

【0025】図において、上記保持筒体6の(I)部分内には、図13に示すように金属板15が時計回りに湾曲させて配設されるとともに、該金属板15の間にパイプ16が挿入配置されている。また、保持筒体6の(II)部分内には、図14に示すように金属板17が反時計回りに湾曲させて配設されている。そして、上記2つの金属板15、17はP2及びP3線部分で対向当接している。

【0026】本実施例では、互いに湾曲方向の異なる金属板15、17を設けたので、上記第4実施例と同様の効果が得られるとともに、保持筒体6内にパイプ16を挿入配置したので、排気ガスの触媒に対する接触面積がより増大するため、浄化効率をより向上でき、かつ金属板15の持つ弾性力を効果的に保持できる。さらに、上記パイプ16の径を変えることで該金属板15同士の間隔を任意に保持することが可能となる。

【0027】また、図15は第2の組立方法で金属板を固定し、保持筒体6に挿入した第6実施例を示す。以下にその方法について説明する。まず、同図(a)に示すように、金属板24の両端を互いに反対方向に同寸法折り曲げるとともに、該金属板24を複数枚重ねる。そして、同図(b)に示すように、押圧パイプ25で上記金

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属板24の中央を押圧し、該押圧パイプ25の両端を固定リング26で固定する。なおこの場合、上記押圧パイプ25は金属板24より固定リング26分だけ長く設定する。そして、同図(c)に示すように、上記金属板24を湾曲させながら、保持筒体6に挿入固定する。

【0028】本組立方法では、押圧パイプ25を用いたので、上記内パイプ7のスリットを不要にでき、工数を削減できる。また、上述したように金属板24の両端を同寸法折り曲げたので、金属板24の保持筒体6近辺の間隔を等間隔に保つことができる。なお、本組立方法は上記折り曲げ加工を施さない金属板に対しても、さらに上記第1～第5実施例にも採用できる。

【0029】ここで、本発明の浄化装置に用いられる金属板の表面形状について、図16～図18に基づいて述べる。なお、図17(b)は同図(a)の(i)方向斜視図であり、図18(b)は同図(a)の(ロ)方向斜視図である。図16は金属板表面にパンチによる丸孔27を設けた例を、図17、18は孔28、29を切り起こしによって設けた例を各々示している。上記の各例は共に、排気ガスが触媒に対して当たり易くなり、また保持筒体6内で該筒体6の軸直角方向のガスの流れが発生することから、浄化効率を向上できる。さらに、上記図17の例では孔28の形状によりガスの流れがスムーズになるため、また図18の例では排気ガスの触媒に対する接触面積が増大するため、装置の能力をより向上できる。

【0030】

【発明の効果】以上のように本発明に係る内燃機関の排気ガス浄化装置によれば、金属板を保持筒体の中心部から放射状に延びるように配置し、該金属板の外側端部を上記保持筒体の内面に弾性力を持って当接させたので、ロー付けを不要にでき、応力集中によるクラック等を防止できる効果があり、また保持筒の径を小型化できる効果があり、さらに流速分布を均一化して耐久性、浄化効率を向上できる効果がある。

【図面の簡単な説明】

【図1】本発明の第1実施例による内燃機関の浄化装置が適用された排気装置の一部断面側面図である。

\*【図2】上記第1実施例による浄化装置の一部断面側面図である。

【図3】上記第1実施例による浄化装置の正面図である。

【図4】上記第1実施例による浄化装置の内パイプに金属板を取り付ける方法について説明するための模式図である。

【図5】本発明の第2実施例による内燃機関の浄化装置の正面図である。

10 【図6】本発明の第3実施例による内燃機関の浄化装置に適用される金属板の斜視図である。

【図7】本発明の第4実施例による内燃機関の浄化装置の断面側面図である。

【図8】上記第4実施例による浄化装置の正面図である。

【図9】図7のIX-IX線断面図である。

【図10】図7のX-X線断面図である。

【図11】本発明の第5実施例による内燃機関の浄化装置の断面側面図である。

20 【図12】上記第5実施例による浄化装置の正面図である。

【図13】図11のXIII-XIII線断面図である。

【図14】図11のXIV-XIV線断面図である。

【図15】第2の組立方法を説明するための模式図である。

【図16】本発明の浄化装置に用いられる金属板の表面形状を示す模式図である。

【図17】本発明の浄化装置に用いられる金属板の表面形状を示す模式図である。

30 【図18】本発明の浄化装置に用いられる金属板の表面形状を示す模式図である。

【図19】従来の浄化装置における複合板の断面側面図である。

【図20】上記従来装置の正面図である。

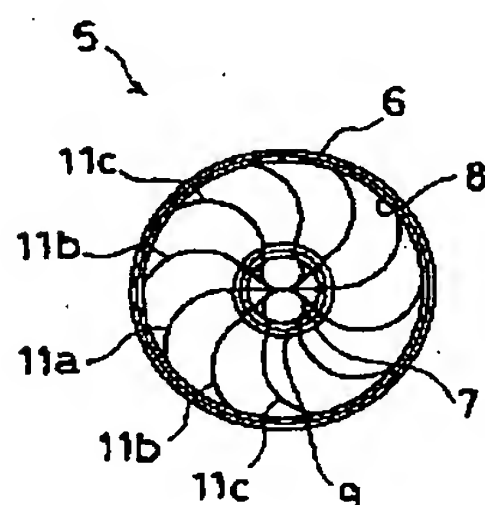
【符号の説明】

5 排気ガス浄化装置

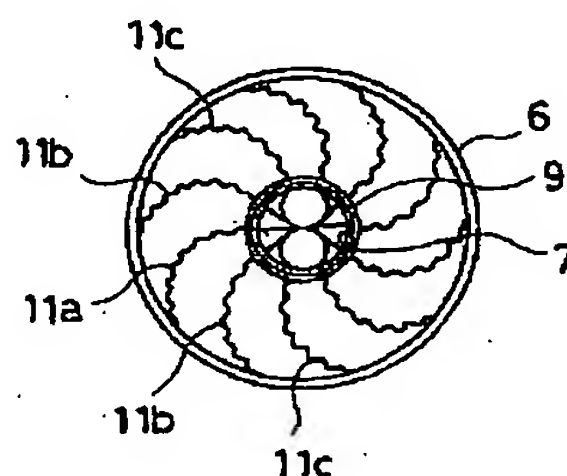
6 保持筒体

11a～11c, 13～15, 17, 24 金属板

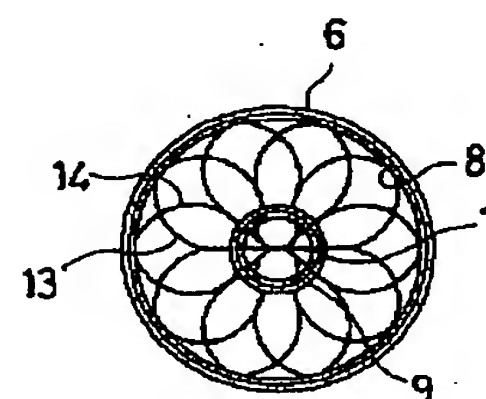
【図3】



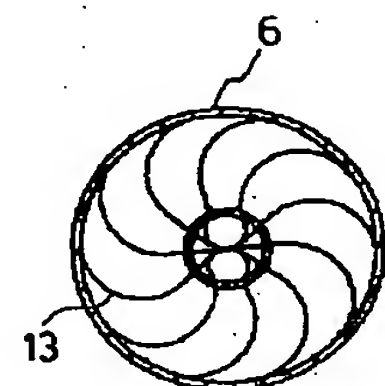
【図5】



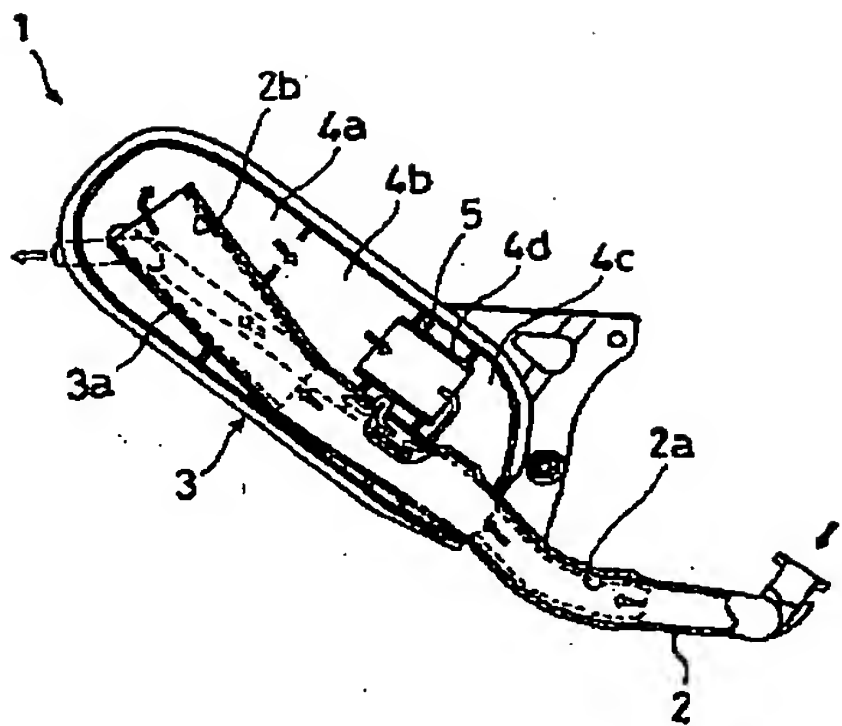
【図8】



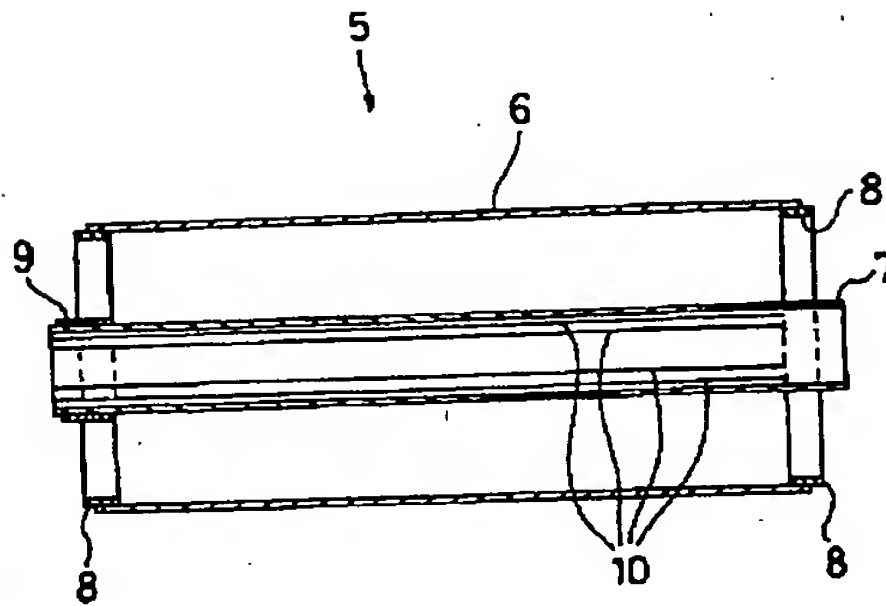
【図9】



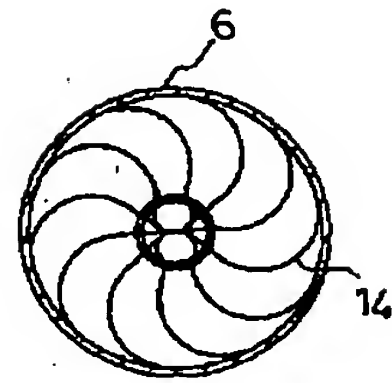
【図1】



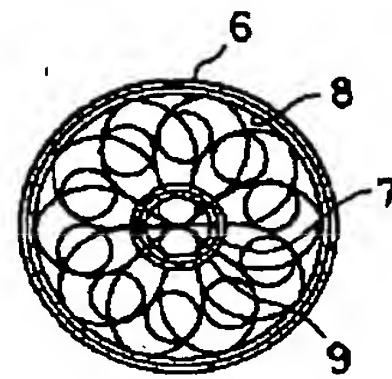
【図2】



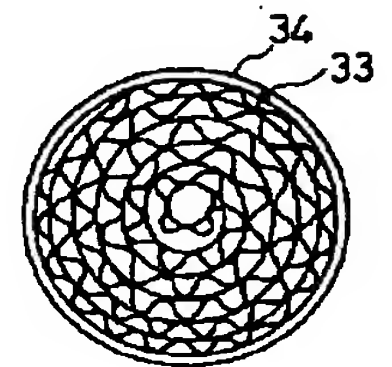
【図10】



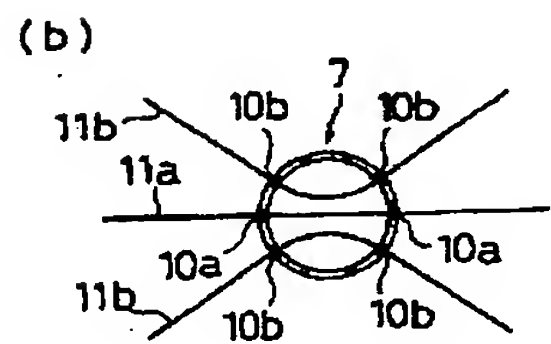
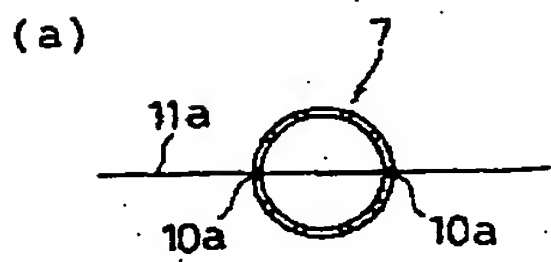
【図12】



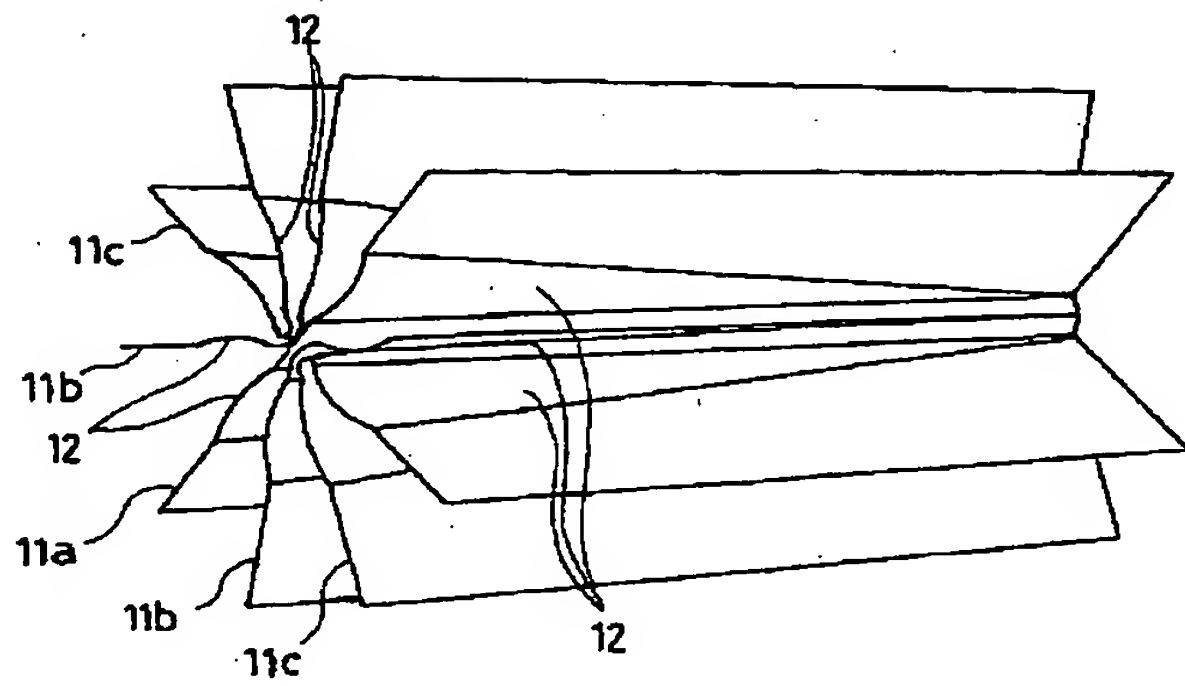
【図20】



【図4】

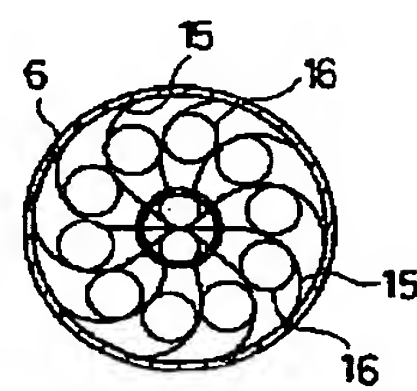
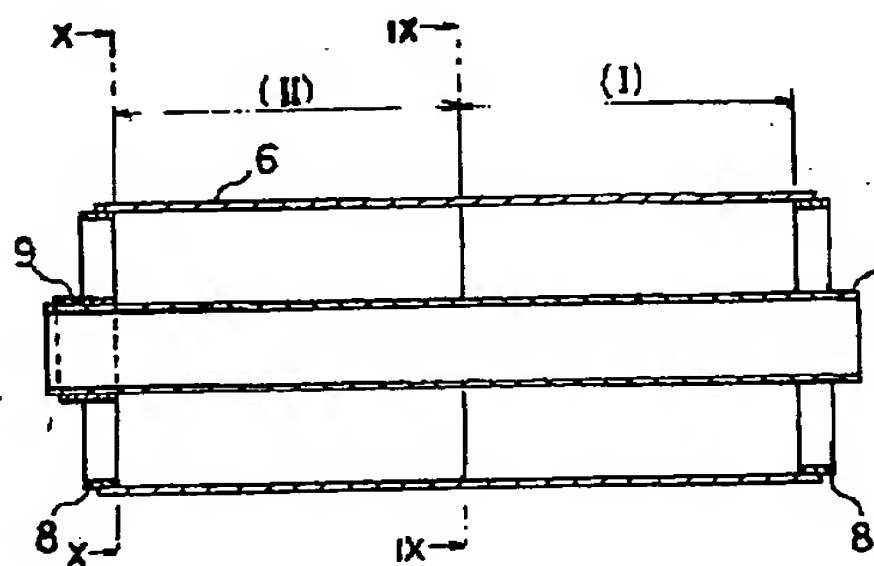
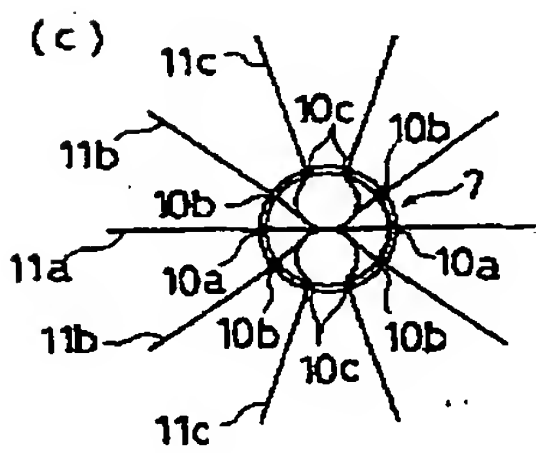


【図6】



【図7】

【図13】

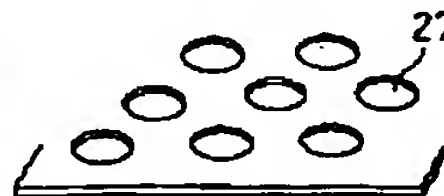
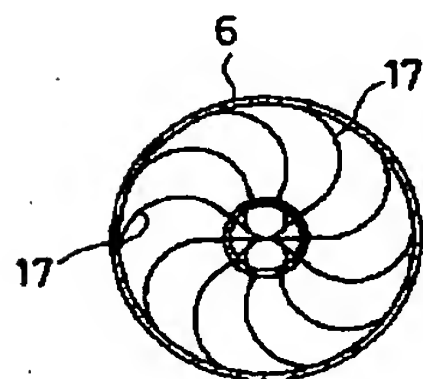


【図14】

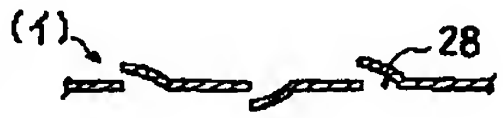
【図16】

【図17】

【図18】



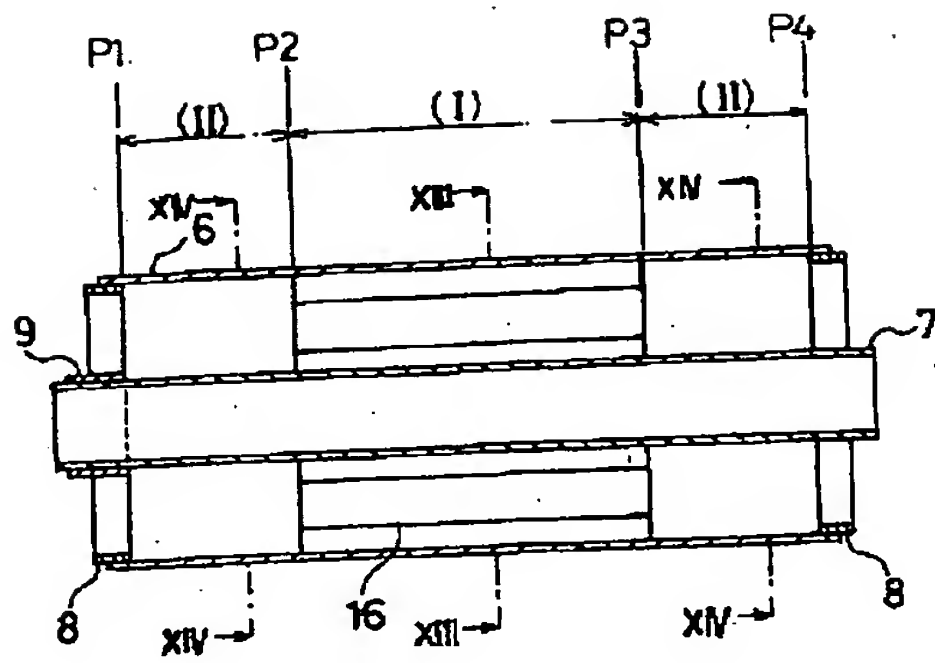
(b)



(b)

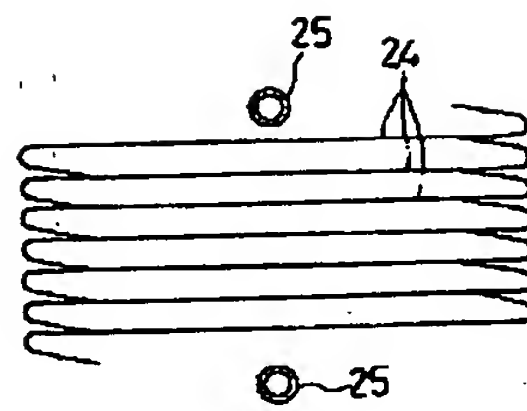


【図11】

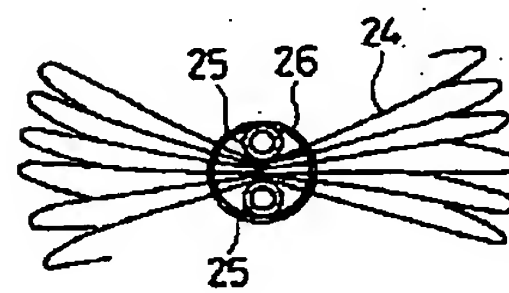


【図15】

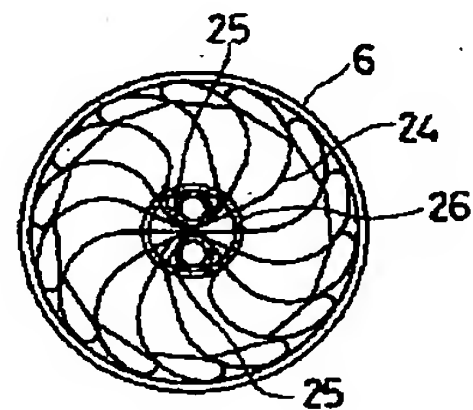
(a)



(b)



(c)



【図19】

